

REMARKS

Claims 1-8 stand rejected in the outstanding Official Action. Claims 1, 2 and 4-7 have been amended and newly written claims 9 & 10 submitted for consideration. Accordingly, claims 1-10 remain in this application.

Attached hereto is a marked-up version of the changes made to the specification and claims by the current amendment. The attached page(s) is captioned "**Version With Markings To Show Changes Made.**"

The Examiner's acknowledgment of applicants' claim for priority and receipt of the certified copy of the priority document is very much appreciated.

The Examiner suggests that the application has been filed with informal drawings which are acceptable for examination purposes. While this is appreciated, it is noted that applicants filed the application with one informal Figure 1 and one formal Figure 1. Therefore, the application was filed with at least one formal drawing.

Additionally, the applicants noted that in formal Figure 1, block 10, the fuel management system is not labeled. Enclosed herewith is a proposed drawing correction adding a label to the block diagram portion of Figure 1. Upon approval of the Examiner and receipt of a Notice of Allowance, applicants will submit a corrected formal drawing in this application.

Claims 1-8 stand rejected under 35 USC §103 as unpatentable over Makhonine (U.S. Patent 2,585,480) in view of Bell (U.S. Patent 5,321,945). The Examiner suggests that Makhonine shows all the details of fuel balancing in the wings to alleviate wing loads, except for automatic control. It is noted that Makhonine was filed more than 50

years ago, at which time those having skill in the art were unaware of the problems of metal fatigue, and especially the significance of such problems in conjunction with very large commercial aircraft, such as the Boeing 747 and the anticipated Airbus A380.

There is no suggestion in Makhonine that the moving of fuel inboard and outboard will alleviate the problem of cyclic fatigue damage to wing structural components caused by the ground-air-ground (GAG) cycling of aircraft. Thus, there is no suggestion in Makhonine of any problem, especially the problem of cyclic fatigue failure which applicants' claims address.

The Bell reference, while disclosing a method of controlling fuel transfers among various tanks in a distributed fuel tank system, does not provide any structure or method of moving fuel dependent upon an aircraft's position and/or its known flight path. In other words, applicants' independent claim 1 specifies that the fuel management system receives inputs that the aircraft has left the ground and/or that the aircraft is approaching its destination. The fuel management system also includes structures for initiating transfers of fuel depending upon receipt of those first and second signals. The Examiner has failed to point out how or where there is any teaching in Bell of either the inputs or a fuel management system which has structures responsive to such inputs.

After detailed review of the Makhonine and Bell references, it can clearly be seen that in neither reference is there any suggestion for combination.

It should be remembered that "the PTO has the burden under §103 to establish a *prima facie* case of obviousness." (Emphasis in original). *In re Fine*, 5 USPQ2d 1596, 1598 (Fed. Cir. 1988). The Court of Appeals for the Federal Circuit held in this case that

the PTO "can satisfy this burden only by showing some objective teaching in the prior art. . . ." Here there is no teaching in either cited prior art reference of receivers for the first and second input signals and/or the transfer initiating means responsive to those signals. Should the Examiner believe these to be taught in either the Makhonine or Bell references, he is respectfully requested to point out the specific column and line number of such teaching.

With respect to the combination of references, the Court of Appeals for the Federal Circuit has confirmed that

"to prevent the use of hindsight based on the invention to defeat patentability of the invention, this court requires the examiner to show a motivation to combine the references that create the case obviousness. In other words, the examiner must show reasons that the skilled artisan, confronted with the same problems as the inventor and with no knowledge of the claimed invention, would select the elements from the cited prior art references for combination in the manner claimed." (Emphasis added).

In re Rouffet, 47 USPQ2d 1453, 1458 (Fed. Cir. 1998). As noted above, there is no recognition of the fatigue problem solved by the present invention in either the Makhonine or Bell references, and therefore, there is no indication as to why one of ordinary skill in the art would even consult either of these references when attempting to solve the fatigue problem which is addressed in the present application.

In view of the above, the Makhonine and Bell references fail to disclose the features of applicants' independent claim 1 and the Office has provided no evidence as to why or how one of ordinary skill in the art would have consulted either of these two references or combined them in the manner of applicants'

claims. Accordingly, there is believed to be no support for any rejection of claims 1-8 under 35 USC §103 and any further rejection thereunder is respectfully traversed.

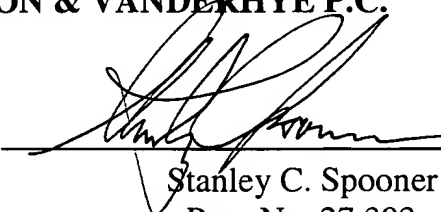
In addition to the amendments to claims 1, 2 and 4-7, applicants offer newly written independent claims 9 and 10 to more broadly cover applicants' claimed invention. Entry and consideration of newly written claims 9 and 10 is respectfully requested.

Having responded to all objections and rejections set forth in the outstanding Official Action, it is submitted that claims 1-10 are in condition for allowance and notice to that effect is respectfully solicited. In the event the Examiner is of the opinion that a brief telephone or personal interview will facilitate allowance of one or more of the above claims, he is respectfully requested to contact applicants' undersigned representative.

Respectfully submitted,

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Enclosure:
Proposed Drawing Correction

VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE SPECIFICATION

Page 1, first paragraph below the Title:

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to fatigue alleviation in aircraft during all phases of the ground-air-ground cycle (GAG).

2. Discussion of Prior Art

Page 2, the paragraph beginning at line 20,

SUMMARY OF THE INVENTION

The present invention seeks to alleviate these problems and provide improved fatigue alleviation during the GAG cycle.

Page 5, the paragraph beginning at line 10:

BRIEF DESCRIPTION OF THE DRAWING

The invention is further described, by way of example only, with reference to the drawing which illustrates a sample fuel tank layout for a large, long range passenger aircraft.

Page 5, the paragraph beginning at line 13:

DETAILED DISCUSSION OF PREFERRED EMBODIMENTS

The drawing shows the distribution of tanks between the fuselage and one wing of an aircraft, the reader will appreciate that the principle can be extended to the second wing of the aircraft and that more or fewer tanks may be used, taking account of the size and fuel requirements of the aircraft in question. The wing (1) comprises 4 fuel tanks, an inner engine feed tank (2), an inner transfer tank (3), an outer engine feed tank (4) and an outer transfer tank (5). A further fuel tank, the centre tank (6) is located in the fuselage (7). Each of the tanks is connected to a fuel line (8) in which, between it and each tank, is located a two way valve (9). The fuel management system [not shown] (10) coordinates the following fuel transfer operation during the GAG cycle.

IN THE CLAIMS

1. (*Amended*) A fuel transfer apparatus for an aircraft comprising:
at least two [or more] fuel tanks [(2,3,4,5,6)] arranged in an inboard to outboard alignment, at least one tank being situated in a wing [(1)] of the aircraft,
[means] at least one pump for transferring fuel between the tanks [(8, 9)], and
a fuel management system [(10)] for controlling and monitoring the transfer of fuel between tanks, said system comprising:
[wherein the fuel management system comprises]
means for receiving a first input signal that the aircraft has left the ground;
means for receiving a second input signal that the aircraft is approaching its destination,

means for initiating the transfer of the fuel from a relatively inboard tank location to a relatively outboard tank location in response to the first input signal, and

means for initiating the transfer of the fuel from a relatively outboard tank location to a relatively inboard tank location in response to the second input signal.

2. *(Amended)* A fuel transfer apparatus as claimed in claim 1 wherein the fuel management system [(10)] is computerised and comprises a computer algorithm designed to respond to the various input signals and initiate the fuel transfer in the desired sequence.

4. *(Amended)* A fuel transfer apparatus as claimed in claim 1 wherein the fuel management system [(10)] is programmed to respond to a first signal sent to the flight control system of the aircraft when the gear wheels have left the ground.

5. *(Amended)* A fuel transfer apparatus as claimed in claim 1 wherein the fuel management system [(10)] is programmed to respond to a second input signal that the aircraft has descended to a certain altitude on its approach to land.

6. *(Amended)* A fuel transfer apparatus as claimed in claim 1 wherein [a] said second input signal is relayed between the flight control program and the fuel management system [(10)] when a certain point on a pre-programmed flight path has been reached.

7. *(Amended)* A fuel transfer apparatus as claimed in claim 1 wherein the fuel management system [(10)] will have manual override facility to enable flight crew to adapt to unforeseen circumstances.